

## IN THE CLAIMS

The following is a complete listing of the claims. This listing replaces all earlier versions and listings of the claims.

Claim 1 (currently amended): A method of creating an image, the image being formed by rendering at least a plurality of graphical objects to be composited according to ~~a hierarchical structure~~ an expression tree representing a compositing expression for the image, ~~the hierarchical structure~~ expression tree including a plurality of nodes each representing at least one region of an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity region representation for at least one node of ~~the hierarchical structure~~ expression tree, the opacity region representation being assigned comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node, wherein a union of each opacity region representation for the expression tree includes at least one of each of the three predetermined values;

determining an obscurance region representation for ~~[[the]]~~ at least one node based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree, the obscurance region

representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of the ~~at least one~~ object represented by at least one node is visible in the image;

partitioning the object into a plurality of regions;

overlaying the obscurance region representation on the partitioned object such that the partitioned object is substantially encompassed within the obscurance region representation;

traversing the overlaid obscurance region representation to identify any of the plurality of regions of the partitioned object which include at least a portion of the visible region; and

creating the image by rendering the identified regions.

Claim 2 (currently amended): The method according to claim 1, said method including the further step of traversing the ~~hierarchical structure~~ expression tree to detect the node including the obscurance region representation.

Claim 3 (previously presented): The method according to claim 1, wherein the obscurance region representation is traversed for each of the plurality of regions of the partitioned object.

Claim 4 (previously presented): The method according to claim 1, said method including the further step of producing a map for the plurality of regions, wherein the map at least indicates any region which includes at least a portion of the visible region.

Claim 5 (previously presented): The method according to claim 4, wherein the map includes a flag for each of the regions which includes at least a portion of the visible region.

Claim 6 (previously presented): The method according to claim 4, wherein the map is produced using run-length encoding.

Claim 7 (previously presented): The method according to claim 4, wherein the map is traversed in a predetermined order to determine the identified regions.

Claim 8 (currently amended): The method according to claim 1, said method including the further step of converting the ~~hierarchical structure~~ expression tree into a right leaning ~~hierarchical structure~~ expression tree.

Claim 9 (currently amended): The method according to claim 1, wherein the ~~hierarchical structure~~ expression tree is a graphic object tree.

Claim 10 (previously presented): The method according to claim 1, wherein the obscurance region representation is a quadtree.

Claim 11 (currently amended): A method of creating an image, the image being formed by rendering at least a plurality of graphical objects to be composited according to a ~~hierarchical structure~~ an expression tree representing a compositing

expression for the image, the ~~hierarchical structure~~ expression tree including a plurality of nodes each representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity region representation for at least one node of the ~~hierarchical structure~~ expression tree, the opacity region representation being assigned comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;

determining an obscurance region representation for ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the hierarchical structure expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of ~~[[the]]~~ at least one object is visible in the image;

traversing the ~~hierarchical structure~~ expression tree to detect the node including the obscurance region representation;

partitioning ~~[[the]]~~ at least one object into a plurality of regions ~~upon detecting the node;~~

overlaying the obscurance region representation on the partitioned object such that the partitioned object is substantially encompassed within the obscurance region representation;

traversing the overlaid obscurance region representation to identify any of the plurality of regions of the partitioned object which include at least a portion of the visible region; and

creating the image by rendering the identified regions.

Claim 12 (previously presented): The method according to claim 11, wherein the obscurance region representation is traversed for each of the plurality of regions of the partitioned object.

Claim 13 (previously presented): The method according to claim 11, said method including the further step of producing a map for the plurality of regions, wherein the map at least indicates any region which includes at least a portion of visible the region.

Claim 14 (previously presented): The method according to claim 13, wherein the map includes a flag for each of the regions which includes at least a portion of the visible region.

Claim 15 (previously presented): The method according to claim 13, wherein the map is produced using run-length encoding.

Claim 16 (previously presented): The method according to claim 13, wherein the map is traversed in a predetermined order to determine the identified regions.

Claim 17 (currently amended): The method according to claim 11, said method including the further step of converting the ~~hierarchical structure~~ expression tree into a right leaning ~~hierarchical structure~~ expression tree.

Claim 18 (currently amended): The method according to claim 11, wherein the ~~hierarchical structure~~ expression tree is a graphic object tree.

Claim 19 (previously presented): The method according to claim 11, wherein the obscurance region representation is a quadtree.

Claim 20 (currently amended): An apparatus for creating an image, the image being formed by rendering at least a plurality of graphical objects to be composited according to a ~~hierarchical structure~~ an expression tree representing a compositing expression for the image, the ~~hierarchical structure~~ expression tree including a plurality of nodes each representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

opacity region representation determining means for determining an opacity region representation for at least one node of the ~~hierarchical structure~~ expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a

corresponding sub-region of at least one object region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node, wherein a union of each opacity region representation for the expression tree includes at least one of each of the three predetermined values;

obscurance region representation determining means for determining an obscurance region representation for [[the]] at least one node of the ~~hierarchical structure~~ expression tree based on an analysis of the opacity region representation associated with [[the]] at least one node of the ~~hierarchical structure~~ expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of the object represented by at least one node is visible in the image;

partitioning means for partitioning the object into a plurality of regions;

overlaying means for overlaying the obscurance region representation on the partitioned object such that the partitioned object is substantially encompassed within the obscurance region representation;

traversing means for traversing the overlaid obscurance region representation to identify any of the plurality of regions of the partitioned object which include at least a portion of the visible region; and

image creating means for creating the image by rendering the identified regions.

Claim 21 (currently amended): The apparatus according to claim 20, wherein said traversing means further traverses the ~~hierarchical structure~~ expression tree to detect the node including the obscurance region representation.

Claim 22 (previously presented): The apparatus according to claim 20, wherein the obscurance region representation is traversed for each of the plurality of regions of the partitioned object.

Claim 23 (previously presented): The apparatus according to claim 20, further comprising map producing means for producing a map for the plurality of regions, wherein the map at least indicates any region which includes at least a portion of the visible region.

Claim 24 (currently amended): The apparatus according to claim 20, wherein the ~~hierarchical structure~~ expression tree is a graphic object tree.

Claim 25 (previously presented): The apparatus according to claim 20, wherein the obscurance region representation is a quadtree.



Claim 26 (currently amended): An apparatus for creating an image, the image being formed by rendering at least a plurality of graphical objects to be composited according to ~~a hierarchical structure~~ an expression tree representing a compositing expression for the image, the ~~hierarchical structure~~ expression tree including a plurality of nodes each representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

opacity information determining means for determining an opacity region representation for at least one node of the ~~hierarchical structure~~ expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;

obscurance region representation determining means for determining an obscurance region representation for ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of ~~[[the]]~~ at least one object is visible in the image;

first traversing means for traversing the ~~hierarchical structure~~  
expression tree to detect the node including the obscurance region representation;  
partitioning means for partitioning the object into a plurality of  
regions upon detecting the node;  
overlaying means for overlaying the obscurance region  
representation on the partitioned object such that the partitioned object is substantially  
encompassed within the obscurance region representation;  
second traversing means for traversing the overlaid  
obscurance region representation to identify any of the plurality of regions of the  
partitioned object which included at least a portion of the visible region; and  
image creating means for creating the image by rendering the  
identified regions.

Claim 27 (previously presented): The apparatus according to claim 26,  
wherein the obscurance region representation is traversed for each of the plurality of  
regions of the partititoned object.

Claim 28 (previously presented): The apparatus according to claim 26,  
further including map producing means for producing a map for the plurality of regions,  
wherein the map at least indicates any region which includes at least a portion of the visible  
region.

Claim 29 (currently amended): The apparatus according to claim 26, wherein the ~~hierarchical structure~~ expression tree is a graphic object tree.

Claim 30 (previously presented): The apparatus according to claim 26, wherein the obscurance region representation is a quadtree.

Claim 31 (currently amended): A computer program for a computer comprising software code portions for performing a method of creating an image, the image being formed by rendering at least a plurality of graphical objects to be composited according to ~~a hierarchical structure~~ an expression tree representing a compositing expression for the image, the ~~hierarchical structure~~ expression tree including a plurality of nodes each representing an object of the image or an operation for combining sub-expressions of the compositing expression, said program comprising:

code for determining an opacity region representation for at least one node of the ~~hierarchical structure~~ expression tree, the opacity region representation being assigned comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node, wherein a union of each opacity region representation for the expression tree includes at least one of each of the three predetermined values;

code for determining an obscurance region representation for ~~[[the]]~~  
at least one node based on an analysis of the opacity region representation associated with  
~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree, the obscurance region  
representation being assigned one or more of a plurality of further predetermined values,  
each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~  
region of the object represented by at least one node is visible in the image;

code for partitioning the object into a plurality of regions;

code for overlaying the obscurance region representation on the  
partitioned object such that the partitioned object is substantially encompassed within the  
obscurance region representation;

code for traversing the overlaid obscurance region representation to  
identify any of the plurality of regions of the partitioned object which include at least a  
portion of the visible region; and

code for creating the image by rendering the identified regions.

Claim 32 (currently amended): A computer readable medium storing a  
computer program, wherein said computer program comprises software code portions for  
performing a method of creating an image, the image being formed by rendering at least a  
plurality of graphical objects to be composited according to a ~~hierarchical structure~~ an  
expression tree representing a compositing expression for the image, the ~~hierarchical~~  
structure expression tree including a plurality of nodes each representing an object of the  
image or an operation for combining sub-expressions of the compositing expression, said  
program comprising:

code for determining an opacity region representation for at least one node of the ~~hierarchical structure~~ expression tree, the opacity region representation being assigned one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;

code for determining an obscurance region representation for ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the ~~hierarchical structure~~ expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of ~~[[the]]~~ at least one object is visible in the image;

code for traversing the ~~hierarchical structure~~ expression tree to detect the node including the obscurance region representation;

code for partitioning the object into a plurality of regions upon detecting the node;

code for overlaying the obscurance region representation on the partitioned object such that the partitioned object is substantially encompassed within the obscurance region representation;

code for traversing the overlaid obscurance region representation to identify any of the plurality of regions of the partitioned object which include at least a portion of the visible region; and

code for creating the image by rendering the identified regions.

Claim 33 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node; and

optimizing the expression tree by determining an obscurance region representation for at least ~~[[the]]~~ one node of the expression tree based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region is~~ region of at least one object is visible in the image.

Claim 34 (previously presented): The method according to claim 33, wherein the opacity region representation is a first hierarchical structure.

Claim 35 (previously presented): The method according to claim 33, wherein the obscurance region representation is a second hierarchical structure.

Claim 36 (previously presented): The method according to claim 33, said method comprising the further step of identifying nodes representing complex graphical object.

Claim 37 (previously presented): The method according to claim 36, said method comprising the further step of determining an opacity region representation for each node identified.

Claims 38 and 39 (canceled)

Claim 40 (previously presented): The method according to claim 33, wherein an opacity region representation of a child node is at least propagated to a parent node associated with the child node.

Claim 41 (canceled)

Claim 42 (previously presented): The method according to claim 33, wherein an obscurance region representation of a parent node is at least propagated to a child node associated with the parent node.

Claim 43 (previously presented): The method according to claim 34, wherein the first hierarchical structure is dependent on an operation associated with a node for which the first hierarchical structure is constructed.

Claim 44 (currently amended): The method according to claim 35, wherein the second hierarchical ~~structures~~ structure for a node ~~[[are]]~~ is constructed by combining any first hierarchical structures associated with the node.

Claim 45 (currently amended): The method according to claim 34, wherein each leaf node of the first hierarchical structure is assigned one of the predetermined values depending on an opacity of a ~~sub-region~~ region associated with the leaf node.

Claim 46 (previously presented): The method according to claim 33, said method including the further step of converting the expression tree into a right leaning tree.

Claim 47 (previously presented): The method according to claim 34, wherein each node of the first hierarchical structure comprises a pointer indicating children nodes associated with the node.



Claim 48 (previously presented): The method according to claim 35, wherein the second hierarchical structure is a quadtree.

Claim 49 (previously presented): The method according to claim 33, wherein the opacity region representation is a bounding box.

Claim 50 (previously presented): The method according to claim 33, wherein the obscurance region representation is a bounding box.

Claim 51 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one ~~or more~~ of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

optimizing the expression tree by determining an obscurance quadtree for at least ~~[[the]]~~ one node of the expression tree using the opacity quadtree associated with ~~[[the]]~~ at least one node of the expression tree, ~~[[and]]~~ the obscurance quadtree being assigned one ~~or more~~ of a plurality of further predetermined values, each

further predetermined value distinctly identifying whether a corresponding sub-region is visible in the image.

Claim 52 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

identifying at least one node having an associated complex graphical object;

determining opacity information for the node;

determining an opacity region representation for the node based on the opacity information associated with the node, the opacity region representation being assigned comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region of at least one object region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by the node; and

optimizing the expression tree by determining an obscurance region representation for the node using the opacity region representation, the obscurance region representation being assigned one or more of a plurality of further predetermined values,

each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~  
region of the object is visible in the image.

Claim 53 (canceled)

Claim 54 (original): The method according to claim 52, wherein each node  
having an associated complex graphical object is tagged.

Claim 55 (canceled)

Claim 56 (previously presented): The method according to claim 52,  
wherein the opacity information is propagated down the expression tree.

Claim 57 (previously presented): The method according to claim 52,  
wherein an opacity region representation of a child node is at least propagated to a parent  
node associated with the child node.

Claim 58 (canceled)

Claim 59 (previously presented): The method according to claim 52,  
wherein an obscurance region representation of a parent node is at least propagated to a  
child node associated with the parent node.

Claim 60 (previously presented): The method according to claim 52, wherein the opacity region representation is dependent on an operation associated with a node for which the opacity region representation is determined.

Claim 61 (previously presented): The method according to claim 52, wherein the obscurance region representation for a node is determined by combining any opacity region representations associated with the node.

Claim 62 (currently amended): The method according to claim 52, wherein each leaf node of the opacity region representation is assigned a value depending on an opacity of a ~~sub-region~~ region associated with the leaf node.

Claim 63 (previously presented): The method according to claim 52, wherein each node of the opacity region representation comprises a pointer to indicate children nodes associated with the node.

Claim 64 (previously presented): The method according to claim 52, wherein the opacity and obscurance region representations are quadtrees.

Claim 65 (currently amended): An apparatus for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object

of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for determining an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of an object represented by at least one node ~~represented by the node of the expression tree~~ is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node; and

means for optimizing the expression tree by determining an obscurance region representation for at least ~~[[the]]~~ one node of the expression tree based on an analysis of the opacity region representation associated with ~~[[the]]~~ at least one node of the expression tree, the obscurance region representation being assigned one or more of ~~three~~ a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region is~~ region of at least one object is visible in the image.

Claim 66 (previously presented): The apparatus according to claim 65, wherein the opacity region representation is a first hierarchical structure.

Claim 67 (previously presented): The apparatus according to claim 65, wherein the obscurance region representation is a second hierarchical structure.

Claim 68 (previously presented): The apparatus according to claim 65, further comprising means for identifying nodes having an associated complex graphical object.

Claim 69 (previously presented): The apparatus according to claim 68, further comprising means for determining an opacity region representation for each node identified.

Claim 70 (previously presented): The apparatus according to claim 67, wherein the second hierarchical structure is a quadtree.

Claim 71 (previously presented): The apparatus according to claim 65, wherein the opacity region representation is a bounding box.

Claim 72 (previously presented): The apparatus according to claim 65, wherein the obscurance region representation is a bounding box.

Claim 73 (currently amended): An apparatus for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

means for optimizing the expression tree by determining an obscurance quadtree for at least ~~[[the]]~~ one node of the expression tree using the opacity quadtree associated with at least one node of the expression tree, the obscurance quadtree being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding sub-region is visible in the image.

Claim 74 (currently amended): An apparatus for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for identifying at least one node having an associated complex graphical object;

means for determining opacity information for the node;

means for determining an opacity region representation for the node based on the opacity information associated with the node, the opacity region representation being assigned comprising one or more of three predetermined values, each

predetermined value distinctly identifying whether a corresponding ~~sub-region of at least one object~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node; and

means for optimizing the expression tree by determining an obscurance region representation for ~~[[the]]~~ at least one node using the opacity region representation, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of at least one object is visible in the image.

Claim 75 (canceled)

Claim 76 (original): The apparatus according to claim 74, wherein each node having an associated complex graphical object is tagged.

Claim 77 (canceled)

Claim 78 (currently amended): A computer program for a computer comprising software code portions for performing a method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object



of the image or an operation for combining sub-expressions of the compositing expression, said program comprising:

code for determining an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node; and

code for optimizing the expression tree by determining an obscurance region representation for at least ~~[[the]]~~ one node of the expression tree based on an analysis of the opacity region representation associated with at least one node of the expression tree, the obscurance region representation being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of at least one object is visible in the image.

Claim 79 (currently amended): A computer readable medium storing a computer program, wherein said computer program comprises software code portions for performing a method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said program comprising:

code for determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

code for optimizing the expression tree by determining an obscurance quadtree for at least ~~[[the]]~~ one node of the expression tree using the opacity quadtree associated with ~~[[the]]~~ at least one node of the expression tree, the obscurance quadtree being assigned one or more of a plurality of further predetermined values, each further predetermined value distinctly identifying whether a corresponding sub-region is visible in the image.

Claim 80 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region represented by the node; and

optimizing the expression tree by determining a compositing information quadtree for at least the node of the expression tree, the compositing information quadtree for a node being determined using the opacity quadtree associated with the node, wherein the compositing information quadtree represents at least one visible region to be composited for an object associated with the node.

Claim 81 (canceled)

Claim 82 (currently amended): The method according to claim 81, further comprising the step of identifying nodes of the expression tree, for which a first ~~hierarchical structure~~ compositing quadtree is required, depending on the opacity quadtree associated with the node.

Claims 83-86 (canceled)

Claim 87 (previously presented): The method according to claim 80, wherein an opacity quadtree of a child node is at least propagated to a parent node associated with the child node.

Claim 88 (previously presented): The method according to claim 87, wherein an opacity quadtree of the parent node is determined by merging at least two further opacity quadtrees.

Claim 89 (previously presented): The method according to claim 87, wherein an opacity quadtree of the parent node is determined by merging at least one opacity quadtree and a bounding box.

Claim 90 (canceled)

Claim 91 (currently amended): The method according to claim 81, wherein ~~an obscurance~~ a compositing quadtree of a parent node is at least propagated to a child node associated with the parent node.

Claim 92 (canceled)

Claim 93 (currently amended): The method according to claim 80, wherein each leaf node of the ~~obscurance~~ opacity quadtree is assigned one of the predetermined values depending on an opacity of a sub-region associated with the leaf node.

Claim 94 (previously presented): The method according to claim 80, wherein each node of the opacity quadtree comprises a pointer to indicate child nodes associated with the node.

Claim 95 (canceled)

Claim 96 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

determining an opacity ~~region-representation~~ quadtree for at least one node of the expression tree, each leaf node of the opacity ~~region-representation~~ quadtree being assigned one of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

optimizing the expression tree by determining a ~~hierarchical structure compositing quadtree~~ for at least one node of the expression tree, wherein the ~~hierarchical structure compositing quadtree~~ is determined for a node using the opacity ~~region-representation~~ quadtree determined for the node, and wherein the ~~hierarchical structure compositing quadtree~~ represents at least visible regions, load regions and invisible regions to be composited, for an object associated with the node.

Claim 97 (currently amended): A method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said method comprising the steps of:

performing a first traversal of the expression tree to determine an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of an object represented by at least one node is an opaque region, a transparent region or a transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;

identifying nodes of the expression tree, for which compositing information is required, depending on the opacity region representation associated with the node; and

optimizing the expression tree by performing a second traversal of the expression tree to determine compositing information for each node of the expression tree identified in the first traversal, wherein the compositing information is determined for a node using the opacity region representation determined for the node, and wherein the compositing information indicates at least invisible regions, load regions and visible regions represented by the node.

Claim 98 (previously presented): The method according to claim 97, wherein the compositing information is represented by a first hierarchical structure.

Claim 99 (previously presented): The method according to claim 98, wherein the opacity region representation comprises a second hierarchical structure representing an opacity of a region associated with a node.

Claim 100 (previously presented): The method according to claim 98, wherein the opacity region representation is a bounding box representing an opacity of a region associated with a node.

Claim 101 (previously presented): The method according to claim 98, wherein the first hierarchical structure is dependent on the opacity region representation.

Claim 102 (previously presented): The method according to claim 97, wherein the first traversal is a bottom-up traversal.

Claim 103 (previously presented): The method according to claim 99, wherein opacity region representation of a child node is at least propagated to a parent node associated with the child node.

Claim 104 (previously presented): The method according to claim 103, wherein opacity region representation of the parent node is determined by merging at least two second hierarchical structures.

Claim 105 (previously presented): The method according to claim 103, wherein opacity region representation of the parent node is determined by merging at least one second hierarchical structure and a bounding box.

Claim 106 (previously presented): The method according to claim 97, wherein the second traversal is a top-down traversal.

Claim 107 (previously presented): The method according to claim 106, wherein a first hierarchical structure of a parent node is at least propagated to a child node associated with the parent node.

Claim 108 (currently amended): An apparatus for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

means for optimizing the expression tree by determining a compositing information quadtree for at least one node of the expression tree, the



compositing ~~information quadtree~~ for a node being determined using the opacity quadtree determined for the node, wherein the compositing ~~information quadtree~~ represents at least one visible region to be composited for an object associated with the node.

Claim 109 (canceled)

Claim 110 (currently amended): The apparatus according to claim 109, further comprising means for identifying nodes of the expression tree, for which a first ~~hierarchical structural compositing quadtree~~ is required, depending on a opacity quadtree associated with the node.

Claims 111 and 112 (canceled)

Claim 113 (currently amended): An apparatus optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for determining an opacity region representation ~~quadtree~~ for at least one node of the expression tree, each leaf node of the opacity region representation ~~quadtree~~ being assigned one of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region represented by the node; and

means for optimizing the expression tree by determining a ~~hierarchical structure~~ compositing quadtree for at least one node of the expression tree, wherein the ~~hierarchical structure~~ compositing quadtree is determined for a node using the opacity ~~region representation~~ quadtree determined for the node, and wherein the ~~hierarchical structure~~ compositing quadtree represents at least invisible regions, load regions and visible regions to be composited, for an object associated with the node.[]]

Claim 114 (currently amended): An apparatus optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said apparatus comprising:

means for performing a first traversal of the expression tree to determine an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding ~~sub-region~~ region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;

means for identifying nodes of the expression tree, for which compositing information is required, depending on the opacity region representation associated with the node; and

means for optimizing the expression tree by performing a second traversal of the expression tree to determine compositing information for each node of the expression tree identified in the first traversal, wherein the compositing information is determined for a node using the opacity region representation determined for the node, and wherein the compositing information represents at least invisible regions, load regions and visible regions to be composited for an object associated with the node.

Claim 115 (currently amended): A computer program for a computer comprising software code portions for performing a method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said program comprising:

code for determining an opacity quadtree for at least one node of the expression tree, each leaf node of the opacity quadtree being assigned one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region is an opaque region, a transparent region or a partially transparent region; and

code for optimizing the expression tree by determining a compositing information quadtree for at least one node of the expression tree, the compositing information quadtree for a node being determined using the opacity quadtree determined for the node, wherein the compositing information quadtree represents at least one visible region to be composited for an object associated with the node.

Claim 116 (currently amended): A computer readable medium storing a computer program, wherein said computer program comprises software code portions for performing a method for optimizing an expression tree, the expression tree representing a compositing expression for compositing an image and comprising a plurality of nodes, each node of the expression tree representing an object of the image or an operation for combining sub-expressions of the compositing expression, said program comprising:

code for performing a first traversal of the expression tree to determine an opacity region representation for at least one node of the expression tree, the opacity region representation ~~being assigned~~ comprising one or more of three predetermined values, each predetermined value distinctly identifying whether a corresponding sub-region region of an object represented by at least one node is an opaque region, a transparent region or a partially transparent region ~~represented by the node such that the opacity region representation simultaneously represents each opaque region, transparent region and partially transparent region of the object represented by at least one node;~~

code for identifying nodes of the expression tree for which compositing information is required, depending on the opacity region representation associated with the node; and

code for optimizing the expression tree by determining a hierarchical structure for at least one node of the expression tree, wherein the hierarchical structure for a node is determined using the opacity region representation determined for the node, and wherein the hierarchical structure represents at least invisible regions, load regions and visible regions to be composited for an object associated with the node.